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OF THE
Kansas Entomological Society

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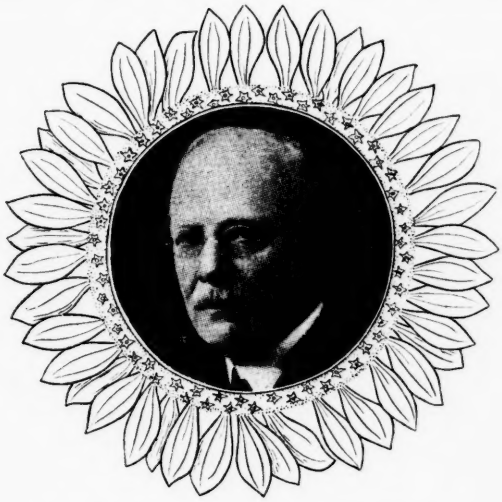

SAMUEL WENDELL WILLISTON
1852 - 1918

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THE GENUS EUPHALERUS IN AMERICA NORTH OF MEXICO (PSYLLIDAE: HOMOPTERA)

L. D. TUTHILL, Iowa State College, Ames, Iowa

(Concluded from Vol. 10, No. 2)

This small white spotted species was described as yellowish orange to reddish brown in general color. The specimens at hand are green with the exception of three specimens from San Diego County, California, which are partially red, principally on the thorax.

Examples from the Santa Rita Mountains, Arizona, were compared with the type from Oracle, Arizona, in the U. S. N. M. by Mr. P. W. Oman. In addition the writer has specimens from Yarnell, Arizona; Upper Lake, Big Bear Lake, Lockwood, Dales, Anza, San Diego, and Siskyou National Forest, California; Grants Pass and Kerby, Oregon.

Euphalerus beameri n. sp.

Resembling **E. vermiculosus** Crawford, in size and general appearance but forewings white to clear with a single black spot at apex of clavus; genal cones larger, broader and less conical. Length to tip of folded wings 3.00—3.25 mm.

Color. General body color red to whitish red. Vertex and genal cones white, with more or less red vermiculation. Thorax and legs reddish. Forewings typically covered with a white bloom, with a prominent black spot at extremity of clavus. Abdomen green.

Structure. Head large, deflexed, vertex flat, slightly pubescent. Genal cones large, rather flat contiguous basally, broadened slightly below juncture with vertex, conspicuously pubescent, very coarsely rugose. Antennae one fourth longer than width of head. Thorax strongly arched. Forewings twice as long as broad, rugose, the pterostigma moderately large.

Genitalia. Male very similar to **vermiculosus.** Proctiger somewhat sinuate on posterior margin, forceps longer, almost as long as proctiger, with large tooth on apex. Female genital segment larger than in **vermiculosus,** almost as long as rest of abdomen, stout, dorsal valve slightly longer than ventral.

Holotype male, allotype female, three male and twelve female paratypes, Big Bear Lake, California, July 26, 1932. Other paratypes as follows: twenty-one males and twenty-two females, San Jacinto Mountains, Calif-

ornia, July 21, 1929, R. H. Beamer; two males and two females, San Diego County, California, July 4, 1929, R. H. Beamer; two males and four females, Laguna Mountains, California, July 6, 1929, R. H. Beamer; one male San Diego County, California, July 4, 1929, L. D. Anderson; one female, Campo, California, August 10, 1935, R. H. Beamer.

Holotype, allotype and paratypes in Snow Entomological Collection, University of Kansas; three pairs of paratypes in author's collection.

This species is named in honor of Dr. R. H. Beamer of the University of Kansas.

Euphalerus jugovenosus n. sp.

Resembling **E. beameri** n. sp., but smaller, veins of forewing much more prominent; color markings very different. Length to tip of folded wings 2.50-3.00 mm.

Color. Head, pronotum and praescutum white, with more or less vermiculate red markings; remainder of thorax dark red; legs somewhat lighter. Forewings hyaline except apex dark through cell Cu, latter black, apical margin alternately black and white; veins with rather regular opaque whitish areas and irregular red spots. Abdomen green, male genitalia and tip of female genital segment red.

Structure. Vertex twice as wide as long, posterior margin almost straight, with large discal impressions. Genal cones large, shorter than vertex, very broad, somewhat divergent, moderately pubescent. Thorax very strongly arched. Forewings short, about twice as long as broad, veins extremely prominent, the pterostigma moderately large.

Genitalia. Male genital segment moderately large. Proctiger large, much produced on posterior margin into a broad lobe, narrowing to truncate apex. Forceps slender, straight, shorter than proctiger, evenly narrowed to large black medially projecting apical teeth. Female genital segment about as long as rest of abdomen, stout, quickly narrowed to acute apex; dorsal valve longer than ventral and very sharp and upcurved at tip.

Holotype male, allotype female, three male and four female paratypes, Lockwood, California, July 24, 1935, R. H. Beamer; one female paratype, Monterey, California, July 22, 1935, Jack Beamer.

Holotype, allotype and paratypes in Snow Entomological Collection, University of Kansas. One pair of paratypes in author's collection.

A GRASSHOPPER SURVEY FOR EASTERN KANSAS, 1936.

LAURENCE C. WOODRUFF, Lawrence, Kansas*

The season of 1936 was one of serious grasshopper injury in Kansas and throughout much of the plains area; by far the worst that has occurred for many years. Added to the effects of an extensive and prolonged drought, the resulting losses were all the more apparent. Few varieties of plants were immune from attack and many, such as the evergreens and fruit trees which suffered girdling of the twigs and branches, in addition to defoliation, will be years in recovering. "Old-timers" availed themselves of the opportunity to reminisce on the locust invasion of the last century but in most such comparisons the existing conditions fell far short of the past. Obviously something was lacking. Extensive flights or migrations which caused so much consternation among the early settlers of the plains region were not observed during the season of 1936. Mass movements of hoppers from one field to another were common but these were mostly of the saltatorial type and, at best, involved a comparatively small area. The complexion of the locust population was apparently composed simply of a greater quantity of the usually abundant species. But casual observations are seldom reliable and it was to establish the identity and relative proportions of the injurious species that this survey was conceived.

Four type habitats were selected as typical of situations commonly inhabited by grasshoppers with the idea in mind that collections of specimens from these would give a characteristic section of the hopper population of this region. The areas chosen were an alfalfa field, a corn field, a weed patch, and a field of prairie grasses.

The field of alfalfa was of about five acres in extent, situated upon a slight southern slope and bounded upon two sides by pasture land. A third side was formed by the bed of a meandering creek with wooded banks; the fourth by a hay field of gamma grass. The latter had been cut during June and because of the heat and drought was practically bare during the entire period of observation.

This same hay field formed the northern boundary

*Contribution from Department of Entomology, University of Kansas

of the ten acre corn field selected and a continuation of the wooded creek defined the western limits. To the east and across a road lay an unused pasture. A large garden area devoted to a variety of crops was located to the south.

The weed patch was simply that—with no adornments. An area of about one-half acre of very heavy soil situated in the center of a pasture had been fenced off and neglected because of poor drainage. This plot would normally have been exceedingly wet, but the soil was baked hard and full of cracks throughout the summer. The predominant plants were ragweed, white clover, sunflowers, and wild lettuce.

On the south slope of the University of Kansas campus there still exists a patch of virgin prairie which has been preserved in its original condition with no attempted plant introduction. Undoubtedly, some of the many plants which have followed man into this region have crept in, but so far as is known the only attention ever given the tract is an occasional burning over. This area should be representative of the original environment of the grasshoppers in the plains states and was selected as one of the four type habitats for this reason. The native grasses of this tract are coarse in texture, dry and brittle as compared with other grasses found in the majority of the pastures or hayfields. Owing to the facts that this preserve was uncut and that no grazing was permitted, a lush growth forming a knee-deep mat covered the ground during the entire summer. The grasses growing here were mostly blue-stems but several other varieties as well as flowering plants were present. When one considers the large number of grasses which have become abundant in this region since the coming of the white man, it seems highly improbable that the original identity of virgin prairie has been maintained. Nevertheless, collections from such a habitat give an interesting and enlightening comparison with those from cultivated regions.

Collections were made thrice weekly in the four plots, beginning July 1st and continuing until August 21st. In each area one hundred sweeps with a twelve inch net were made at a fast walk through the plant growth. Undoubtedly such a procedure was at fault in that many 'hoppers in the direct path escaped, but at least

the records for all plots were comparable. The material was brought to the laboratory and classified by comparison with specimens in the Snow Collection previously identified by Morgan Hebard (1931). Many specimens were probably misidentified, for in the case of some closely related species only minute differences were discernible, but considering the volume of material handled a few misnamed individuals would not change the picture perceptibly. The type of information desired did not warrant the burdening of a specialist with the onerous task of determining all of the collections. The worst difficulty was encountered in the separation of **Melanoplus femur-rubrum** and **Melanoplus mexicanus.** The males of these two species are fairly distinct but I never was able to distinguish the females. To avoid this impossible situation, the females of the two species for a particular sample were divided in the same proportion as the males had occurred. This procedure is unquestionably subject to great error, but the only plausible answer to the problem of handling such a mass of material.

Results of Collections

During the period covered by these observations, a total of 9824 individuals were collected, of which 4227 were nymphs. For the latter no attempt at classification was made, leaving a total of 5597 identified specimens upon which the records here described are based. The distribution of this total of nearly six thousand individuals within the four plots under observation was as follows:

Alfalfa	3382	60.5% of total
Corn	718	12.8% of total
Prairie	759	13.5% of total
Weed patch	738	13.2% of total

The larger total gathered from the alfalfa field might be explained in part by the fact that sweeping could be done with greater facility in a ground coverage of this type than was possible in either the corn field or the weed patch where the plants were shoulder high. The same argument cannot be applied, however, to explain the difference between the alfalfa field and the area of prairie grass, and the true answer probably lies in the more succulent nature of the former crop.

The percentile distribution of species in the total col-

lections from all plots are here given:

Species	No.	% of Total
Melanoplus femur-rubrum (DeGeer)	2867	51.5
Melanoplus differentialis (Thomas)	738	13.0
Melanoplus mexicanus (Saussure)	656	11.5
Melanoplus bivittatus (Say)	567	10.1
Orphulella pelidna (Burmeister)	221	4.0
Orphulella speciosa (Scudder)	205	3.7
Mermiria bivittata (Serville)	175	3.1
Syrbula admirabilis (Uhler)	81	1.4
Hippiscus rugosus (Scudder)	24	0.5
Chortophaga viridifasciata (DeGeer)	21	0.4
Ageneotettix deorum (Scudder)	16	0.3
Dissosteira carolina (Linnaeus)	11	0.2
Others:	15	0.3

These include:

Melanoplus keeleri (Dodge)
Schistocerca americana (Drury)
Schistocerca lineata Scudder
Pardalophora haldemanii (Scudder)
Arphia xanthoptera (Burmeister)
Dichromorpha viridis (Scudder)
Mermiria maculipennis Bruner

The dominance of **Melanoplus femur-rubrum,** comprising fifty per cent of the total collection of adults, is perhaps the most striking item in the list but scarcely more so than the fact that the bulk (85%) of grasshoppers for eastern Kansas during 1936 was made up of four species. Curiously enough, all are members of the genus Melanoplus.

While the records of total collections are interesting, those of the individual plots appear to be more instructive. In the tables below, the principal species are listed along with their percentage of the total for each plot.

ALFALFA (Total 3382)

Melanoplus differentialis (Thomas)	7.1%
Melanoplus bivittatus (Say)	6.5%
Melanoplus femur-rubrum (DeGeer)	69.0%
Melanoplus mexicanus (Saussure)	12.7%
All others	4.7%

Melanoplus femur-rubrum shows itself to be the

outstanding alfalfa pest, a dominance even more striking when we consider the large number of individuals concerned. From observations in the field at the time the collections were being made, I gained the impression that **Melanoplus differentialis** and **Melanoplus bivittatus** were more common than the tabulated results indicate. For this reason I hesitate to give an unqualified statement as to the vastly greater importance of one over the others. This discrepancy might be explained by the fact that the larger species are more active and thus better able to avoid capture in the net. A second and somewhat more tenable solution is to be found in the definite movements of the larger species out of the alfalfa into the surrounding fields with the depletion of the available food. On the other hand, **Melanoplus femur-rubrum** maintained itself at a fairly constant level throughout the season, even after the plants become fairly well defoliated during August. I am inclined to believe that probably both of these factors were influential. Samples from the trough of a hopperdozer being used in other alfalfa fields in Douglas County contained a much greater percentage of the larger species than were found in my collections.

WEED PATCH (Total 738)	
Melanoplus differentialis (Thomas)	36.5%
Melanoplus bivittatus (Say)	26.6%
Melanoplus femur-rubrum (DeGeer)	21.0%
Melanoplus mexicanus (Saussure)	12.7%
All others	2.3%

In this series there is no dominant species, but rather four strong contenders, again the outstanding members of the genus Melanoplus. Minor species are surprisingly scarce in this area, comprising only 2.3% of the total. Likewise, few nymphs were collected among the weeds during the entire season. On the other hand, the numbers of adults increased gradually through July and held up well during August while the collections in other sections were on the wane. This is further evidence of the contention made above that the larger species were moving from the alfalfa as the season progressed. **Melanoplus femur-rubrum,** while plentiful, does not make up such a large proportion of the total here as in alfalfa.

PRAIRIE (Total 759)

Melanoplus differentialis (Thomas)	15.5%
Melanoplus bivittatus (Say)	8.8%
Melanoplus femur-rubrum (DeGeer)	3.3%
Melanoplus mexicanus (Saussure)	6.9%
Orphulella pelidna (Burmeister)	21.3%
Orphulella speciosa (Scudder)	15.2%
Mermiria bivittata (Serville)	18.5%
Syrbula admirabilis (Uhler)	6.2%
All others	4.3%

Grasshoppers apparently belie their name. At least, this seems to be true for the species which cause the bulk of injury to agriculture. Certainly they do not occur in such large proportions here among the native grasses as elsewhere. In their places among the abundant forms, we find a number of species which in the cultivated areas are rare. The scarcity of **Melanoplus femur-rubrum** is particularly striking. The prairie regions are undoubtedly the native habitat of the genera Orphulella, Mermiria, and Syrbula.

Not only were the notorious species conspicuously scarce in the prairie grasses, but the injury by those which were present was of little consequence. Seldom has serious damage by grasshoppers been reported for native grasses. The coarse texture and dry nature of these plants which fit them for existence under prairie conditions at the same time render them less palatable than more succulent and softer bodied plants. Wilbur (1936) attributes the injury to the inflorescence of grasses by locusts to a search more for water than for food.

CORN (Total 718)

Melanoplus differentialis (Thomas)	14.8%
Melanoplus bivittatus (Say)	13.6%
Melanoplus femur-rubrum (DeGeer)	33.5%
Melanoplus mexicanus (Saussure)	17.6%
Orphulella pelidna (Burmeister)	6.5%
Orphulella speciosa (Scudder)	5.0%
Mermiria bivittata (Serville)	7.4%
All others	1.6%

The inclusion in this list of several species even more characteristic of the prairie region (see above) points to

a similarity between these two areas. True, the fence-row of the corn field was composed largely of native grasses but the sweepings, although made along this side of the field, were confined to the cultivated crop. The species in question, then, while undoubtedly originating in the grass, had to be feeding or at least resting on the corn in order to be caught. **Melanoplus femur-rubrum,** here as in the alfalfa, is the leading species but not dominantly so. The same sources of error, encountered for the larger species of Melanoplus for alfalfa, undoubtedly prevailed in the corn also. As a matter of fact, the progress of migration was observed during the early part of August after the plants began to show material evidence of injury. Collections from this field were discontinued on August 14th when what was left of the crop was cut for fodder.

Discussion

Over four thousand nymphs were collected along with the adults during the season but were not identified. These immature forms comprised the chief part of the collections at first, but by the middle of July a parity had been reached and during August nymphs gradually disappeared. Quite naturally this decline was accompanied by a corresponding increase in the number of adults.

Grasshoppers have long been the worst insect menace in the prairie regions, remaining as endemic pests across the years, bursting into unusual prominence during periods of drought. The same climatic factors which foster arid conditions also are favorable to the development of these insects. The species which caused the major part of the trouble during 1936 were those generally abundant year after year. The ubiquitous red-legged locust **(Melanoplus femur-rubrum)** was especially injurious to alfalfa but by no means was it confined to this crop. For, over the countryside in general, samples always contained a high percentage of this form. **Melanoplus mexicanus** certainly did not live up to its reputation, given by Hebard and others, as our most numerous grasshopper. Although widely and fairly evenly distributed, it was the least common representative of the four notorious members of the genus Melanoplus. The migratory phase of this species (variety **spretus**), which is responsible for much of the reputation that Kansas and other mid-western states have for devastating grasshopper invasions, was not taken in spite

of newspaper stories to the effect that this greatly feared insect had returned after many years of absence. Of the two larger species of the genus, **Melanoplus differentialis** continues to be the more abundant and undoubtedly the more injurious, but its margin over **Melanoplus bivittatus** is not great and the indications are that the latter is on the increase. Irrespective of my own collections, I cannot but feel that **Melanoplus differentialis** and **Melanoplus bivitatus** were more prevalent than indicated by the actual counts. Casual but repeated observations in grasslands, field crops, orchards, and gardens lead me to this belief. Of course, **Melanoplus femur-rubrum** shows up so strongly because of its preponderance in alfalfa, but the evidence of observation and of samples from the trough of a hopperdozzer indicate that the more robust species, especially **M. differentialis,** were far more abundant than shown by the results of net-sweeping. This apparent discrepancy may be accounted for in two ways: first, because the larger forms perhaps are more wary and avoid capture in the net; second, because they moved out of the cultivated fields as these became defoliated during the progress of the season while **Melanoplus femur-rubrum** showed little tendency toward migration.

A slight but definite diminution in the mass of the collections occurred toward the end of the period covered by these observations. This was due, in part, to the fact that the corn plot was cut for silage on August 14, but the crop already had been seriously injured by that time and concerted movements of hoppers from the field had been noted. The alfalfa field also had reached the stage, during the first half of August, where there was little left in the way of food but the stems of plants. Even the weed patch, which at first had been the focus of migrations from other fields, was beginning to show the effects of continued feeding. Naturally, with the decline of the crops under observation, the hoppers moved into locations offering more succulent food.

Migrations, such as those noted in the other three plots, were not observed for the grasshoppers infesting the prairie grasses. Here, the collections maintained a fairly constant level throughout the summer, so that, while there was no evident movement away from that quarter, neither was there any great influx. On the other hand, the individual collections in this plot never reached

the peak of the others and consequently the season's total was scarcely larger. An almost entirely distinct fauna was characteristic of this area. The members of the genus Melanoplus, so dominant elsewhere, were reduced to an equal, or even lesser, footing with four species of the slant-face group. Minor forms, which were not recorded individually, also occurred more often among the native grasses. Of all the plots under observation, the prairie region showed less indication of serious injury at the end of the season, a condition probably accountable to a more complete ground coverage and a less succulent food.

A distinct similarity, with respect to the kinds of grasshoppers involved, was evident between the prairie and corn plots. While not so abundant in the corn, many species were held in common by the two places, species not found to any extent in the alfalfa or weeds.

Summary

Serious grasshopper injury occurred in Kansas, as elsewhere in the plains region, during the season of 1936. For the purpose of determining these grasshopper populations, repeated collections were made in typical habitats and the relative abundance of nineteen species recorded.

A fairly distinct fauna was found to be characteristic of the prairie grasses as compared with those of the cultivated crops. Actual injury to the native grasses was slight.

The principal injurious species all belonged to the genus Melanoplus. **Melanoplus mexicanus** was of only minor importance while its migratory phase, **spretus,** was not observed. **Melanoplus femur-rubrum** was the outstanding pest of alfalfa, but also abundant elsewhere. **Melanoplus differentialis** and **Melanoplus bivittatus** were slightly less abundant than the red-legged locust, but due to their larger size and more voracious feeding, were probably of nearly equal importance.

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The Orthoptera of Kansas
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Grasshopper injury to the inflorescence of pasture grasses.
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MINUTES OF THE THIRTEENTH ANNUAL MEETING OF THE KANSAS ENTOMOLOGICAL SOCIETY

Kansas State College,
Manhattan, Kansas
April 3, 1937

Business Meeting

President D. A. Wilbur called the meeting to order at 10:35 a. m. in room 52, Fairchild Hall.

The minutes of the twelfth annual meeting were read and approved.

Reports of Officers.

The secretary reported that the Society has 117 subscribers distributed in England, Canada, Germany, Peru, China, and the United States.

The treasurer's report was read and approved as follows: The Society has as assets three United States Savings Bonds $487.50, these mature in ten years to the value of $650; in the checking account of the treasurer, $248.45; current accounts receivable $46.03; old accounts receivable (H. M. Hefley) $4.78; current bills $67.63 in connection with printing Volume 10, No. 2. The net assets of the Society are $786.76 plus $1.50 cash plus $11.08 due from the printer for overpayment, less the liabilities of $67.63; or a net total assets of $731.81.

The secretary-treasurer stated that he had served for ten years and that he desired to have someone else elected to the office.

Report of editor: P. B. Lawson made a comment on the type of papers which have been published in the past few years. He stated that the type of papers should be selected to fit closer the purpose of the Journal. The subject of modifying the price of separates was brought forth due to the comments of authors of papers. R. L. Parker made the comment that the scope of the Journal had been widened to the Trans-Mississippi area and that the primary function was the publication of insect lists, taxonomic, and biological papers. R. H. Painter made the comment that the published material be more or less confined to the Great Plains Area. H. B. Hungerford stated that the Journal should be maintained in a varied nature and should be open to the general amateur as well as to the professional in the science. The price of separates should remain the same and not be lowered. E. G. Kelly suggested that he would like to see some issue

in each volume devoted to economic entomology. R. L. Parker stated that this was contrary to the policy of the publication committee since the idea in view was to maintain each issue of a varied nature in so far as possible.

Reports of Standing Committees:

Wild Life. No report.

Appointment of Committees.

Nominations committee.

Kathleen Doering
H. R. Bryson
P. B. Lawson

Resolutions Committee.

H. H. Walkden
Milton W. Sanderson
B. A. Osterberger

Auditing Committee.

N. E. Good
L. C. Woodruff

Old Business. None.

New Business.

The matter of junior membership in the Kansas Entomological Society was brought up and a letter from Max Kisliuk, Jr. of the New York Entomological Society was read in regard to this matter. Hazel E. Branch, chairman of the Junior Academy of Science, commented upon the Junior Academy of Science groups stating that groups were formed in high schools and paid individual dues. The motion was made and carried that the matter of Junior membership in connection with entomology be left with the Junior Academy of Science.

President D. A. Wilbur at this time announced that a sound film "Hidden Enemies" would be shown by W. A. Talbott of the Underhill Terminix Company. This was the 101st presentation of this film. Following the showing of this film President Wilbur announced that the meeting and presentation of papers would carry through until 12:30 p. m. The following papers were presented:

1. "A Grasshopper survey for eastern Kansas, 1936." Laurence C. Woodruff, U. of K., Lawrence.

2. "Orthoptera of the prairie." Don B. Whelan, U. of Nebraska, Lincoln.

3. "Differential injury to corn and sorghums by grasshoppers". A. M. Brunson and R. H. Painter, Kan.

Agr. Exp. Sta.

4. "The need of further research work on the biology and control of grasshoppers." George A. Dean, Kan. Agr. Exp. Sta.

Discussion: L. C. Woodruff stated that grasshoppers did not feed when the temperature was above 90 degrees F. and that during certain periods of the summer it was evident that grasshoppers did not feed to any great extent unless it was about two or three o'clock in the morning when the temperature dropped below 90 degree F. D. A. Wilbur stated that the usual temperature range for feeding by grasshoppers was from 70 to 85 degrees F.

5. "A curious beetle from Australia." Milton W. Sanderson, U. of K., Lawrence.

This presentation dealt with the beetle living in the posterior alimintary canal of Kangaroos.

6. "The genus **Novellina.**" Dale Lindsey, U. of K., Lawrence.

7. "The Rate of regeneration in the cockroach." Lois Seaman, U. of K., Lawrence.

Adjourned 12:30 p. m.

Reconvened 2:10 p. m.

8. "Some parasites of Saturniid pupae." Louis J. Lipovsky, U. of K., Lawrence.

9. "Notes on an interesting food habit of false wire worm adults." H. H. Walkden, Bur. Ent. and Plant Quar., U. S. D. A., Manhattan, and H. R. Bryson, Kan, Agr. Exp. Sta., Manhattan.

10. "Attempts to infect termites with a pathogenic fungus of the genus **Empusa.**" C. R. Rogers, K. S. C., Manhattan.

11. "Some aspects of the physiological chemistry of insects." H. D. Thomas, U. of K., Lawrence.

12. "Sixth insect population summary of Kansas covering the year, 1936." Roger C. Smith, and E. G. Kelly, K. S. C., Manhattan.

13. "The English sparrow (**Passer domesticus** L.) as a means of transmitting ectoparasites to chicken pens." Wm. L. Hoyle, K. S. C., Manhattan.

14. Some leafhoppers of the short-grass region of the U. S." Raymond H. Beamer, U. of K., Lawrence.

15. "The Control of the flat-headed borer with paradichlorobenzene paraffin mixture. (**Chrysobothris femorata** Fab., Buprestidae, Coleoptera)." L. M. Copen-

hafer, Kan. Highway Commission.

16. "Two new species of the genus **Potamobates.**" H. B. Hungerford, U. of K., Lawrence.

17. "Biological studies on mosquitoes of the genus Psorophora." H. H. Schwardt, K. S. C., Manhattan.

18. "Notes on the mosquitoes of Kansas." Miss N. A. Demoss, K. S. C., Manhattan.

19. Omitted "A specimen file of insect injuries to Kansas grasses." D. A. Wilbur, Kan. Agri. Exp. Sta., Manhattan.

20. "The biology and control of the redbud leafroller (**Gelechia cercerisella** Chem., Gelechidae, Lepidoptera)" R. L. Parker, Kan. Agr. Exp. Sta., Manhattan.

21. "The architecture of the generalized Insect." Philip Leverault, U. of K., Lawrence.

22. "The head of **Ramphocorixa acuminata** (Uhler)." Melvin E. Griffith, U. of K., Lawrence.

23. "Differential resistance to chinch bug attack in certain strains of wheat." Elmer T. Jones, Bur. of Ent., and Plant Quar., U. S. D. A., Manhattan.

24. "Some notes on **Anacentrinus subnudus** (Curculionidae, Coleoptera)." B. A. Osterberger and M. A. Christian, La., Agr. Exp. Sta., Baton Rouge, Louisiana.

Final business.

Reports of Committees.

Auditing Committee:

These accounts (treasurer's accounts for 1936) have been audited this 3rd day of April, 1937, and found to be in order.

(Signed) L. C Woodruff. N. E. Good

The motion was made and carried to accept this report of the auditing committee.

The auditing committee made a report at the suggestion of the secretary-treasurer that a safety lock box be obtained in which to deposit valuable papers of the Society. A motion was made and carried that the secretary-treasurer rent a safety lock box.

Resolutions Committee.

1. Be it resolved: That the Kansas Entomological Society express to the officials and to the Department of Entomology at the Kansas State College, to the officers of the Kansas Academy of Science, and to the Committee on arrangements, its appreciation for the excellent facilities provided for its meeting and entertainment.

2. Be it further resolved: That this society express its appreciation to the outgoing officers for their faithful and interested leadership, to the publication committee for maintaining the high quality of the Journal, and to the retiring secretary-treasurer for the very efficient manner in which he has handled the affairs of the Society during his ten year tenure of office.

3. Be it further resolved: That the committee feels that the individual members of the Society should do all in their power to further the study of entomology among interested members of the Junior Academy of Science.

4. Be it further resolved: That in as much as the attendance of our annual meetings has greatly increased, and that the expense of entertainment may place undue financial burden on a local group, the committee is of the opinion that the policy of the Society in the future should be that each person in attendance assume his pro rata share of the expenses. In the past, the informal evening meeting have been a source of great pleasure, affording opportunity for social contact among the members, and the committee feels that these informal gatherings be continued whenever possible.

(Signed)
H. H. Walkden, Chairman
B. A. Osterberger
Milton W. Sanderson

The motion was made and carried to accept as a whole the report of the resolutions committee.

Nominations Committee.
Warren Knaus, president
L. C. Woodruff, vice-president
H. H. Walkden, secretary-treasurer.

Publications Committee.
P. B. Lawson
Warren Knaus
R. H. Painter
Dwight Isely
R. H. Beamer

(Signed)
Kathleen Doering, Chairman
H. R. Bryson
P. B. Lawson

A motion was made and carried that the report of the nominations committee be accepted.

The secretary-treasurer asked that his books be audited from January 1 through April 1, 1937, since the work of the auditing committee was only for the calendar year 1936. President D. A. Wilbur appointed N. E. Good as special auditing committee.

President D. A. Wilbur called vice-President L. C. Woodruff to the chair to preside but since there was no unfinished business the meeting was adjourned. Adjourned at 5:55 p. m.

There were 72 members and friends present from Atwood, Beloit, Emporia, Lawrence, Lindsborg, Manhattan, Sterling, Topeka, Wichita, Winfield.

In the evening a banquet and entertainment was held at the Manhattan Country Club with seventy-seven persons present.

R. L. PARKER, Secretary.

A REVIEW OF THE GENUS OSBORNELLUS IN THE UNITED STATES AND CANADA (HOMOPTERA-CICADELLIDAE)

R. H. BEAMER, Lawrence, Kansas*

This paper is an attempt to define the known species of the genus Osbornellus and name at least a part of the new forms that have been found. No little difficulty has been experienced in trying to sort out the various species, even with the aid of the internal male genitalia. We must have a thorough host plant study to be able to satisfactorily accomplish this task. The females, except in a very few instances are practically useless when it comes to characters of specific value. Color pattern of the dorsum, especially of the vertex, has been used wherever possible. The length and breadth of the vertex were also useful in separating some of the more complex groups. The characters of most value, however, are to be found in the internal male genitalia, especially in the lateral view of the aedeagus with its processes.

This study is based on the material in the Snow Entomological Collection, that in the United States National Museum, and that in the collection of Doctor E. D. Ball

*Contribution from the Department of Entomology, University of Kansas.

of Tucson, Arizona.

The genus Osbornellus was separated from Scaphoideus and nicely characterized by Doctor E. D. Ball with **Scaphoideus auronitens** (Prov.) designated Genotype. (New Genera and Species of Leafhoppers Related to Scaphoideus, Journal Washington Academy of Science, Vol. 22, January 4, 1932, E. D. Ball). It is easily recognized by the long attenuate tips to the plates of the males. Eleven old species have been recognized (including one from Mexico which may occur in the U. S.) and thirteen are here described for the first time.

Key to the Species of Osbornellus

1. Margin of vertex definite, at least near apex, usually marked with two more or less parallel lines excepting **(O. albonototus)** 2
   Margin of vertex rounded, markings not connected nor parallel 7
2. Vertex with orange markings 3
   Vertex without orange markings 6
3. Orange markings of vertex transverse 4
   Orange markings of vertex longitudinal 5
4. Female with median notch in last ventral segment; male plate to attenuation one third longer than greatest width ..... **auronitens** (Prov.) Fig. 1
   Female without median notch in last ventral segment; male plates to attenuations barely longer than greatest width ..... **rotundus** n. sp. Fig. 3
5. Larger species 5.5 to 6.5 mm. in length ..... **jucundus** (Uhler) Fig. 2
   Smaller species, 4 to 4.75 mm. in length ..... **cocanus** Ball Fig. 5
6. Lines of vertex margin often not continuous nor parallel. Elytra with white areoles ..... **albonotatus** (V. D.) Fig. 6
   Lines of vertex continuous and almost parallel. Elytra without white areoles. ..... **ritanus** Ball Fig. 4
7. Vertex concolorous ..... **unicolor** (Osb.) Fig. 7
   At least some color pattern on vertex 8
8. Dorsum appearing slightly cross-banded 9
   Dorsum not cross-banded 11
9. Head, pronotum, and scutellum much darker than elytra yellowish brown, very few lighter aereoles in elytra ..... **ignavus** Ball Fig. 8
   Dorsum with lighter band just back of scutellum;

many light aereoles in elytra; veins dark, color fuscous 10

10. Fasciate appearance more definite; vertex sharper, with more light markings at base; processes of aedeagus well-developed, as long as shaft ..... **bifasciatus** n. sp. Fig. 9

Not so plainly cross-banded; vertex less sharp with more of base covered with fuscous; processes of aedeagus attenuate, not reaching to tip of shaft .... **tenuis** n. sp. Fig. 10

11. Markings of vertex sharply defined 12

Margins of markings of vertex rather indefinite, suffused 14

12. Two basal white spots of vertex typical L-shaped .. 13

Basal white spots consisting of four longitudinal dashes ..... **decorus** n. sp. Fig. 11

13. Pygofer of male truncate; yellow area of disc of vertex large; dark lines of apical portion sharp .... **clarus** n. sp. Fig. 12

Pygofer of male rounded; black transverse bar of disc of vertex very large.. (Ariz.) .. **omani** n. sp Fig. 13

14. Length of vertex longer than width between eyes .. 15

Length of vertex about the same or shorter than width between eyes 18

15. Large, 6 mm. or more .... (Calif.) ..... **curvatus** n. sp. Fig. 14

Smaller, usually about 5 mm. 16

16. Apices of male plates much more slender; shaft of aedeagus straight with processes resembling deer antlers.... (Kans.-Mo.) .... **corniger** n. sp. Fig 15

Apices of male plates broad; aedeagus curved, processes not forked. 17

17. Markings of dorsum rather indefinite; aedeagus in lateral view not unusually wide, processes longer than shaft..... (Calif.) ..... **scalaris** (V. D.) Fig. 16

Markings of dorsum more clearly defined; aedeagus in lateral view about one-fourth as wide on basal half as length, processes very slender, not as long as shaft.... (Ariz.) ..... **spicatus** n. sp. Fig. 17

18. Vertex wider between eyes than median length 19

Vertex of about same width as length 21

19. Very dark colored, almost black ..... (Ariz., N. Mex.) ..... **fumidus** n. sp. Fig 18

Of usual tawny color 20

20. Smaller species 5 mm; processes of aedeagus about one-fifth length of shaft....(Mex.) .... **mexicanus** (Osb.) Fig. 19
Larger species, 6 mm. and over; aedeagus with large processes.....(Conn. to Miss.) .... **alatus** n. sp. Fig. 20

21. Male pygofer with truncate apices 22
Male pygofer with rounded apices 23

22. Usually quite lightly marked; aedeagus of about same width throughout with processes almost as wide....(Ariz.) ..... **pallidus** n. sp. Fig. 21
Usually much darker, markings elongated giving a lineate appearance; aedeagus in lateral view more than twice as wide at base as apex, processes very slender....(Ariz.) ..... **lineatus** n. sp. Fig. 22

23. Processes of aedeagus with many branches....(east of Mississippi River) ..... **consors** (Uhler) Fig. 23
Processes of aedeagus not branched 24

24. Shaft of aedeagus in lateral view broad, straight, processes greatly widened on middle half....(Tex.) ..... **ater** n. sp. Fig. 25
Shaft of aedeagus in lateral view of about same width throughout, narrow, curved, processes not thickened over so much of their length if at all .... (N. W. U. S. & Can.). ..... **borealis** DeL. Fig. 24

Osbornellus auronitens (Prov.)

Scophoideus auronitens Provancher, Pet. Faune Ent. Can., iii, p. 277, 1889.

"2 Golden-flash Scophoid. **Scophoideus auronitens,** n. sp.

Length, 5.6 mm. Clear, horn-yellow; the vertex reddish with a pale line at the base and a small triangle at the tip circumscribed by dark lines, three dark lines run also on the border of one eye to the other. The prothorax and the scutellum each with a reddish band at the base. Elytra of a beautiful clear, brilliant horn-yellow with nervures a little darker, forming at the outer edge toward the apex two large, elongated cells; the clavus bears on its inner margin three spots or small brown lines. Wings white with brown nervures. Venter pale yellow. Posterior legs with black tips.—Red cap.

Quite distinct from the preceding by its coloration and the cells of its elytra. Mr. Uhler had, it appeared,

given to this insect the name of **jucundus,** but having described nowhere that we know of, we have believed it necessary to give it the present name."

This species is outstanding with its bright orange band on the vertex and the female with the last ventral segment with a median notch.

Genitalia. Last ventral segment of female more than twice as broad as preceding, lateral margins broadly rounding, posterior margin with V-shaped notch usually deep, often extending two-thirds distance to base. Male valve broadly rounding; plates about as wide at base as valve, at least one third longer to filamentous portion than greatest basal width; styles with outer half heavy with sides almost parallel, apex rounded slightly concave on outer margin just before apex. Aedeagus in lateral view of medium size slightly curved dorsally, with pair of broad processes arising laterally just before base of shaft, flaring slightly, extending just beyond apex of shaft in dorsally pointed apices.

Specimens have been examined from the following localities: Notchland, N. H.; New Haven, Conn.; Vineland, Ont.; Ithaca, N. Y.; Windsor, Vt.; Douglas Co., Kans.; Ottawa Co., Okla.; Walnut, N. C.; Ashton, Md.; Itasca St. Park, Minn.; Plummers Id., Md.; East River, Conn.; Washington, D. C.; Fairfax Co., Va.; Long Id., N. Y.

Osbornellus rotundus n. sp.

Resembling **O. auronitens** (Prov.) but vertex more acute, posterior margin of last ventral segment of female convexly rounded, male plates to the beginning of filament almost quadrate, processes of aedeagus slender and longer than shaft, outer half of styles with sides not parallel and often with small knobs at apex. Length, 5 mm. to 5.5 mm.

General color tawny. Vertex margin light with three dark lines running almost parallel from eye to eye, the lower dark band lighter. Disc of vertex with broad band of orange connecting each eye with dark median dash on its anterior border. Pronotum with anterior margin between eyes orange, back of which is a more or less definite row of darker spots. Elytra tawny with lighter areoles. Clavus with three dark spots on mesal margin and usually another on claval suture.

Genitalia. Last ventral segment of female with posterior margin almost truncate to slightly extended medially. Male valve broad, usually with an angular extension between plates; plates to the beginning of the attenuation almost as wide as long, distinctly shorter than in **O. auronitens;** styles with outer half narrowed, tapering to slightly knobbed tips; aedeagus rather long and slender, slightly curved dorsally with a pair of lateral processes arising one-fourth distance from base, slightly diverging from shaft, gradually tapering to sharp apices; pygofer rather narrow with rounded apex.

Holotype male, allotype female, Tuskegee, Ala., July 22, 1930, L. D. Tuthill. Paratypes as follows: nine males, ten females, Tuskegee, Ala., July 22, 1930; 11 males, eight females, Lexington, S. C., August 24, 1930; one male, three females, Plattsburg, Ga., July 25, 1930; seven males, four females, Okefenokee Swamp, Ga., August 3, 1934; three males, nine females, Dismal Swamp, Va., August 13, 1934; eight males, thirteen females, Iuka, Miss., July 14, 1930; fifteen males, eight females, Ft. Meade, Fla., Aug. 13, 1930; four males, nine females, Lake Drummond, Va., Sept. 10, 1933, P. W. Oman; one male, five females, Washington, D. C., July 28, 1931; thirteen males, eight females, East River, Conn., 1910; types and paratypes in Snow Entomological Collection and in the U. S. N. M.

Osbornellus jucundus (Uhler)

Scaphoideus jucundus Uhler, Md. Acad. Sci., i, p. 34, 1889.

This beautiful reddish brown species is easily separated from **O. auronitens** and **rotundus** by the two longitudinal orange spots on the vertex instead of the transverse one in the latter and by the very elongate plates of the male.

Genitalia. Posterior margin of last ventral segment of female almost truncate, very slightly produced with an indication of a median notch. Valve of male triangular; plates very long and slender, length to attenuation more than twice that of widest place; styles long and slender, rather straight for the genus; aedeagus in lateral view curved ventrally, shaft long with a pair of retrorse diverging, curving, apical processes, about one-third as long as shaft; pygofer short, broad at base and narrowing rapidly to rounded tips.

A female in the U. S. N. M. bearing the following

label in Uhler's handwriting **"Scaphoideus jucundus** Uhler, Md." is here designated Lectoholotype and a male, Berlin, Md., June 26, 1933, described above, neoallotype.

Osbornellus cocanus Ball

Osbornellus cocanus Ball, E. D., Jr. Wash. Acad. Sci., Jan. 4, 1932, p. 18.

This beautiful little species is well characterized by Doctor Ball. It is like **O. jucundus** but much smaller, with longer and more acute vertex.

Genitalia. Male valve angular but not so acute as in **O. jucundus;** plates narrow, more than twice as long to attenuation as greatest width, attenuation slender, not so long as basal portion; styles abruptly narrowed slightly beyond middle, slender portion gradually narrowing to apices; aedeagus in ventral view curved slightly ventrally with pair of retrorse, almost straight apical processes; pygofer almost as broad as long, apical portion abruptly narrowed on outer margin, apex sharp.

Types examined. In collection of Dr. Ball. One paratype in Snow Entomological Collection.

Osbornellus albonotatus (Van Duzee)

Scaphoideus albonotatus Van Duzee, E. P., Bull. Buf. Soc. Nat. Sci., ix, p. 226, 1909.

This species is well characterized by the general dark coloring together with the three pairs of white spots of the clavus and the aedeagus narrowed in the middle with its pair of apical, retrorse, curving processes.

Genitalia. Last ventral segment long with lateral margins almost straight, posterior margin almost truncate. Male valve semi-circular; plates narrower at base than valve, basal portion considerably longer than attenuated flaccid apices; styles broad on basal two-thirds, apical third suddenly narrowed to one-fourth basal width with parallel sides; aedeagus in dorsoventral view with broad base, shaft narrowed at middle to about one-third basal width, with pair of dorsal, retrorse, outwardly curving processes, about one-fourth distance from tip.

Specimens are at hand from Likely, Fla., Cocoanut Grove, Fla., Okefenokee Swamp, Ga., and Virginia Beach, Va. Numerous other specimens were examined from Sanford, Fla.

Osbornellus ritanus Ball

Osbornellus ritanus Ball, E. D., Jr. Wash. Acad. Sci.,

p. 17, 1932.

That Doctor Ball correctly placed this species as near **O. auronitens** is substantiated by the form of the internal genitalia of the male.

Genitalia. Male valve quite short, sides almost parallel; plates narrow at base, small, length to attenuation about twice that of greatest width, attenuated portion at least twice as long as basal, quite broad; styles abruptly narrowed on outer third, apical third with sides almost parallel, slight bump on middle of inner margin, apex notched; aedeagus short, stout, slightly curved dorsally, tapering toward apex, pair of processes arising ventrally, wider than shaft and about one-half longer, tapering to sharp apices.

Numerous specimens at hand from high in the mountains of southern Arizona.

Osbornellus unicolor (Osb.)

Scaphoideus consors var. **unicolor** Osborn, Herbert J., Cinc. Soc. Nat. Hist., xix, p. 196, 1900.

Easily distinguished from all the other species by the dense brown coloring without definite markings on anterior half of body.

Genitalia. Last ventral segment of female at least twice as long as preceding, lateral margins broadly rounded, posterior margin almost truncate, often slightly excavated either side a short median tooth. Male valve almost parallel sided; plates narrower at base than valve, length to attenuation more than twice greatest width; styles narrowed on outer half, enlarging at apex to truncate tips; aedeagus composed of two bifid structures, the ventral one about half as long as dorsal, much broader, apparently constructed so as to receive the dorsal member in its forked apex.

Specimens are at hand from Mississippi, Louisiana, Georgia, Florida and North Carolina.

Osbornellus ignavus Ball

Osbornellus ignavus, Ball, E. D., Bull. Brook. Ent. Soc., XXXI, 1, p. 18, 1936.

This beautiful western species is easily separated by the much darker coloring of the pronotum and scutellum.

Genitalia. Last ventral segment of female long, lateral margins rounded to an evenly convex posterior margin; male valve short and broad; plates narrower at base than valve, length to attenuation one-third more

than greatest width; styles on outer third narrowing to long slender tips; aedeagus in lateral view long and slender, curved dorsally with pair of long slender processes arising near base of shaft, running almost parallel to and slightly beyond tip of shaft.

Paratypes from the type locality are at hand.

Osbornellus bifasciatus n. sp.

Resembling **O. tenuis** but more distinctly two banded and male aedeagus in lateral view almost straight with processes of about same width and length. Length 5.5 mm.

Vertex acute, less than a right angle, width between eyes distinctly less than length at middle.

Color. General ground color cinereous, vertex, pronotum, and scutellum and posterior half of elytra darker. Face fuscous with numerous incomplete light arcs. Vertex marked as usual in this group with dark markings heavy, lighter areas weak. The outstanding feature of the coloring is the unusually large light area in the region of the base of clavus and corium giving the species a two banded appearance.

Genitalia. Last ventral segment of female about twice as long as preceding, posterior margin angularly produced, a semblance of a median notch at middle. Male valve very short, roundingly obtuse with slight projection at middle; plates narrower at base than valve, length to attenuation at least twice that of greatest width, attenuated portion narrow and much shorter than basal; styles abruptly narrowed near middle, outer half almost straight on outer margin, inner margin narrowing for half its distance, then parallel with outer margin; aedeagus in lateral view almost straight from near base to tip with pair of ventral processes of about same width and length.

Holotype male, Santa Rita Mts., Ariz., July 5, 1933, E. D. Ball; allotype female and one paratype female, same data except taken June 30, 1930. In collection of E. D. Ball.

Osbornellus tenuis n. sp.

Resembling **O. clarus,** but with less white markings on vertex, generally a little darker, with pygofer broad and short with apex rounded and aedeagus in lateral view nearly straight with processes attenuated, not much more than two thirds length of shaft. Length 5-5.5

mm.

Vertex about a right angle, length between eyes slightly less than median length, margins slightly arcuate.

Color. General color cinereous tinged with tawny marked with fuscous. Vertex typical of the group with markings fairly distinct. Elytra with large whitish areoles, veins dark.

Genitalia. Last ventral segment of female more than twice as long as preceding, lateral margins broadly rounded to middle of posterior margin. Male valve broad, obtusely angular; plates narrower at base than valve; length to attenuation less than twice that of greatest width, attenuated tips about as long as basal portion; styles abruptly narrowed near middle, outer third quite slender, tip slightly enlarged; aedeagus in lateral view straight on basal two-thirds, then slightly bent dorsally, basal ventral processes very weak and attenuated, reaching to about the outer fourth of shaft.

Holotype male, allotype female, one male and three female paratypes, Atascasa Mt., Ariz., E. D. Ball. Other paratypes as follows: one male and one female, Oak Creek Canyon, Ariz., R. H. Beamer; one male, Long Valley, Ariz., E. D. Ball; one male, Tucson, Ariz., E. D. Ball; one male, Huachuca Mts., Ariz., June 11, 1933, P. W. Oman. Types and paratypes in Ball's collection, paratypes in Snow Entomological collection and U. S. N. M.

Osbornellus decorus n. sp.

Resembling **O. omani** n. sp., but with even more dark markings on the vertex, the middle cross band of which encloses a small white spot on each side, the vertex more sharply angled and the aedeagus in lateral view much longer, bent dorsally, then ventrally, on outer third. Length 5 mm.

Head acute, less than a right angle; median length of vertex almost one-third more than width between eyes.

Color cinereous marked with fuscous. Vertex dark with the following light marks: apical spot with very small lateral wings, triangular spot just back of this, two light dashes almost connecting this to ocelli, three pairs of more or less longitudinal basal dashes, outer touching eye, the next, small, almost connected to outer with a light dot in black field forward of anterior end, and long

inner pair. Veins of elytra dark, more or less bordered with fuscous.

Genitalia. Male valve short, obtusely rounded; plates broad, length to attenuation about one-third longer than greatest width, attenuate tips narrow, about equal in length to basal portion; styles abruptly narrowed near middle, bent sharply out, tapering to slender apices; aedeagus in lateral view long, bent dorsally, outer third tapering slightly, curved back ventrally, pair of weak processes arising near first bend, extending to tip; pygofer much longer than wide, free portion very short, apex truncate.

Holotype male, Dulzura, Calif., Aug. 9, 1935, R. H. Beamer. In Snow Entomological Collection.

Osbornellus clarus n. sp.

Resembling **Osbornellus consors** (V. D.) but usually easily separated by the brilliance of the dark fuscous lines and yellow spots of the vertex, by the very slender, dorsally curved aedeagus with the accompanying long slender processes and by the truncate apices of male pygofers. Length 5 to 5.5 mm.

Vertex about a right angle, margins rounded, length about equal to width between eyes.

Vertex characterized by clear cut markings. Markings as in **O. scalaris** (V. D.) but more definite. Apex with white dot with lateral wing-like projections on margins of vertex and median white triangle more or less connected to dot, all bordered by quite definite fuscous lines; scutellum quite light, basal angles with large dark spots. Elytra cinereous, veins darker.

Genitalia. Last ventral segment of female twice as long as preceding; posterior margin evenly produced from rounded lateral angles. Valve of male short, slightly angled; plates narrower than valve at base, length to attenuated portion scarcely twice that of greastest width; styles sharply narrowed near middle, slightly angled out, gradually tapered to tips with slight bump on inner margin near middle of tapered portion; aedeagus in lateral view long and very slender, curved dorsally with a pair of very slender curved processes arising ventrally at base and extending about to apices of shaft; pygofer wider at base of anal tube than length from there to tip, apex truncate.

Holotype male, allotype female, Doniphan Co., Kans.,

July 20, 1924. Paratypes as follows: 7 females, 8 males, Douglas Co., Kans., Trap Light, Paul B. Lawson, 1928-1930; 2 males, Tigerville, S. C., 1930; 1 male, 4 females, Houma, La,. 1931; 2 females, Leland, Miss., 1921; 1 male, Hamilton, Miss., 1930; 1 female, Prairie. Miss., 1921; 1 female, Prattsburg, Ga., 1930; 1 female, Fulton, Miss., 1930; 1 male, Orange Co., Texas, 1928: 1 female, Tallulah, La., 1929; 1 female, Shuqualak, Miss., 1930; 1 female, Tuskegee, Ala., 1930; 1 female, Hilliard, Fla., 1930; 4 males and 2 females, Sanford, Fla., 1933-34; two females, Meridian, Miss., 1930; 1 female, Barnes, Ariz., 1932; in U. S. N. M. 1 male, Ocala, Fla., 1923; 3 males, College Park, Md., 1933; 2 males, Berlin, Md., 1933; 2 females, 1 male, Annapolis, Md., 1932; 1 male, Bristol, Ky., 1933; 2 males, Savannah, Ga., 1933; 1 female, Washington, D. C., 1932; 2 males, 1 female, Kerrville, Tex., 1906; 2 females, Victoria, Tex., 1915; 1 pair, Vienna, Va., 1932; 7 females and 6 males, Sanford, Fla., E. D. Ball.

Osbornellus omani n. sp.

Resembling **O. clarus** but with all markings generally much darker, especially the fuscous rectanglar spot just back of the light triangle on anterior portion of vertex, which occupies most of the upright of the light L-shaped marks usually present at base of vertex and the aedeagus of the male with its processes which contact shaft and extend to outer third. Length 5 mm.

Vertex blunt, slightly more than a right angle; as wide between eyes as length at middle; ocelli of male very large, touching eye.

Color. General ground color brownish gray, profusely marked with fuscous. Vertex with usual apical light spot connected to ocelli with arcuate light bands bordered with fuscous; median light triangle with yellow spots each side, and more or less rectangular fuscous spot just caudad; normal light L-shaped basal spots reduced to rectangular ones with concave anterior borders. Pronotum irrorate with fuscous. Scutellum dark, with a few light inclusions. Elytra dark with usual lighter areoles, veins quite dark.

Genitalia. Last ventral segment of female at least twice as long as preceding, lateral margins rounded from the base to middle of posterior margin. Male valve short, margins almost parallel; plates narrower at base

than valve, length to attenuation slightly more than greatest width; styles strongly narrowed and bent slightly outward near middle, outer half straight and slightly tapered to tip; aedeagus in lateral view fairly broad at base, narrowed on outer third with a pair of closely appressed processes arising ventrally at base and ending in sharp points at outer third.

Holotype male, allotype female, five female paratypes, Patagonia, Ariz., R. H. Beamer; additional paratypes; 2 males and 9 females, Patagonia, Ariz., June 24, 1933, P. W. Oman; 7 males and 10 females, Patagonia, Ariz., E. D. Ball.

At least a portion of the type series was taken from sycamore. Types in Snow Entomological Collection, paratypes in U. S. N. M. and collection of E. D. Ball.

Osbornellus curvatus n. sp.

Resembling **O. scalaris** (V. D.) but definitely larger, 6 mm. or more in length, pygofer barely longer than wide and male style with outer fourth much thinner. Length 6-6.25 mm.

Vertex rather sharp, about a right angle, median length slightly greater than width between eyes.

Color General ground color cinereous marked with fuscous. Vertex with typical marking for this group with lateral wing-like marks to median triangle rather definite, also the dark border to the L-shaped light marks of base pronounced. Elytra with light areas somewhat larger than usual, veins darkened.

Genitalia. Last ventral segment of female at least twice as long as preceding, lateral angles broadly rounded to middle of posterior margin. Valve of male short, obtusely angular; plates broad at base, but narrower than valve, length to attenuation about twice as long as greatest width, attenuated portion considerably shorter than basal, narrow for the size of the insect; styles abruptly narrowed near middle, inner margin of outer half converging to long narrow tips, outer margin almost straight; aedeagus in lateral view of medium size, slightly curved dorsally and narrowing toward tip with pair of ventral processes arising at base of shaft, narrow at base, widening to outer third then narrowing to sharp apices slightly beyond apex of shaft. Pygofer very short and broad, scarcely longer than wide, lower posterior margin converging or narrowing to dorsal.

Holotype male, allotype female, Giant Forest, Calif. July 28, 1929, R. H. Beamer; paratype male, Yosemite, Calif., June 29, 1931, E. D. Ball. Types in Snow Entomological Collection, paratypes in collection of E. D. Ball.

Osbornellus corniger n. sp.

Resembling **O. scalaris** n. sp. but with attenuated apices of male plates more slender and with long, straight slender aedeagus in lateral view with paired processes that resemble deer antlers. Length 5-5.25 mm.

Vertex acutely angled, especially the male, median length almost one-fourth longer than width between eyes. Ocelli large, close to eyes.

Color. General ground color tawny as in **O. clarus,** except that only anterior dark lines of vertex are sharp; the yellow spots are broader and posterior markings of vertex tend to fade out. Elytra tawny sub-hyaline, with usual lighter areoles, veins darker in spots.

Genitalia. Last ventral segment of female almost three times as long as preceding; lateral angles broadly rounded to truncate posterior margin. Male valve long for this genus, with small projection between plates; plates narrower at base than valve, length to attenuation about one third longer than greatest width; styles gradually narrowed from base to tip, bent out near middle; aedeagus in lateral view long, slender, straight, with pair of ventral, antlered processes arising at base, extending directly away from shaft, then bent parallel with it. ending in long slender tips beyond end of shaft; pygofer broad at base, short with rounded apices.

Holotype male, allotype female, and two male paratypes, Douglas County, Kan., Light Trap, Paul B. Lawson; other paratypes, one male, Douglas Co., Kan., E. S. Tucker; and one male, Atherton, Mo., C. F. Adams. Types in Snow Entomological Collection.

Osbornellus scalaris (Van Duzee)

Scaphoideus scalaris Van Duzee, E. P., Ent. Am., vi, p. 51, 1890.

This species resembles **O. consors** (Uhler) but vertex is sharper, and distinctly longer than width between eyes, while **consors** is about the same, aedagus long and slender with processes unbranched.

Genitalia. Last ventral segment of female very long, lateral margins broadly rounded to rather truncate posterior margin which appears almost notched in mak-

ing the angle over the ovipositor. Male valve very broad, sides almost parallel; plates narrower than valve at base, length to attenuation about one third longer than greatest width; styles abruptly narrowed at middle, tapering to slightly enlarged apices with a small tooth on inner margin near outer fourth; aedeagus in lateral view narrow, slightly curved dorsally with pair of processes arising ventrally near base of shaft, swerving with shaft to flare away from it near its apex, about one-fourth longer than shaft; pygofer rather short, measured at base of anal tube slightly broader than from the same place to apex.

Lectoholotype male, California Coq., Lectoallotype female, California Coq., No. 623, two cotypes in the Iowa State College collection, Ames, Iowa, described above are here designated. Specimens are at hand from: Orange Co., Calif.; San Diego Co., Calif.; Monrovia, Calif.; Nipomo, Calif.; Alpine, Calif.; Santa Cruz Co., Calif.

Osbornellus spicatus n. sp.

Resembling **O. scalaris** (V. D.) but markings of dorsum more definite, and aedeagus in lateral view very broad, longer than processes and many times as wide at the base. Length 5 mm.

Vertex acute, distinctly longer than width between eyes.

Color tawny with lighter areoles and darker spots. Vertex light with an unusual amount of golden yellow. Elytra suffused tawny with lighter areoles and darker spots; veins darker in some portions.

Genitalia. Last ventral segment of female more than twice as long as preceding, lateral margins broadly rounding to middle of posterior margin. Valve of male short, broadly rounded; plates broad at base, length to attenuation about one-third more than greatest width, attenuations narrow and shorter than basal portion; styles abruptly narrowed slightly before middle, sides converging to somewhat enlarged tips; aedeagus in lateral view almost one-fourth as wide at base as total length, almost straight, sides almost parallel to middle, then converging to sharp somewhat hooked tip, ventral basal processes very slender, not reaching apex; pygofer almost twice as long as greatest width, apex almost truncate.

Holotype male, allotype female, Granite Dell, Ariz., July 30, 1933, R. H. Beamer; 1 male paratype, Granite

Dell, Ariz., August 17, 1929, E. D. Ball. Types in Snow Entomological Collection, paratype in collection of E. D. Ball.

Osbornellus fumidus n. sp.

Resembles **O. mexicanus** (Osb.) but much darker in color, almost entirely smoky, head much blunter with markings suffused and aedeagus of male in lateral view at least twice as wide as processes and separated from them by its own width. Length 5 to 5.5 mm.

Vertex rather blunt, almost one-fourth wider between the eyes than median length. Ocelli very large, light colored.

Color dark, almost fuscous throughout. Vertex dark except apical spot with lateral wings, small triangle near middle and two small spots in basal angles. Remainder of dorsum usually heavily infuscated. Veins of elytra darker with a few lighter areoles in clavus and corium.

Genitalia. Last ventral segment of female almost three times as long as preceding, lateral margins rounded to almost flat posterior margin. Male valve short, obtusely angular; plates narrow at base, about twice as long to attenuation as greatest width, attenuations scarcely as long as basal portion of medium width; styles abruptly narrowed at middle, tapering on outer half to rather slender, almost knobbed tips; aedeagus in lateral view of about equal width throughout, curved dorsally with ventral processes arising at extreme base, about one-third as wide as shaft, separated from it by about its own width, extending parallel with it to tip; pygofer about twice as long as wide with rather rounded apex.

Holotype male, allotype female taken as a mating pair, and three male paratypes, Monument, Colo., August 19, 1936, R. H. Beamer; paratypes as follows: two males and seven females, Chiricahua Mts., Ariz., E. D. Ball; one male, Silver City, New Mexico, July 22, 1936, D. R. Lindsay; one male, Huachuca Mts. Ariz., July 20, 1933, E. D. Ball; one male, Long Valley, Ariz., E. D. Ball. Types and paratypes in Snow Entomological Collection; paratypes in collection of E. D. Ball.

Osbornellus mexicanus (Osb.)

Scaphoideus mexicanus Osborn, Herbert Jr., Cinn. Soc. Nat. Hist., June 26, 1900, p. 197.

Resembling **O. scalaris** (Van D.) but vertex much blunter, width between eyes distinctly greater than

median width and male aedeagus in lateral view long, slender, strongly curved dorsally with processes at base of shaft scarcely one-sixth as long as shaft.

Genitalia. Last ventral segment of female more than twice as long as preceding, lateral margins rounded almost from base to middle of posterior margin. Male valve short, angular; plates narrower than valve, length to attenuation less than twice greatest width; flaccid tips rather broad, longer than basal portion; aedeagus in lateral view narrow, long and strongly curved dorsally with ventral basal processes reduced to about one-sixth length of shaft; pygofer broad at base, rapidly narrowing to semi-truncate apex.

Female specimen No. 5402 in U. S. N. M., Orizaba, V. C., Mex., Sept. 16, 1892, is here designated lectohолotype.

Osbornellus alatus n. sp.

Resembling **O. mexicanus** (Osb.) but distinctly larger, deeper brown in color and male aedeagus in lateral view straight, with processes much broader and longer than aedeagus. Length 6-6.5 mm.

Vertex. Rather blunt, a little wider than long.

General ground color tawny. Darker and lighter marks of vertex merging, barely a semblance of the usual light and dark areas. Elytra tawny with the usual lighter areoles.

Genitalia. Last ventral segment at least twice as broad as preceding, lateral margins broadly rounding to truncate posterior margin. Valve of male broadly angular with small median projection between plates; plates at base narrower than valve, length to attenuations less than twice greatest width, flaccid apices long and slender; styles rapidly narrowed near middle, outer half tapering and bending slightly out; aedeagus in lateral view long, narrow and almost straight with pair of ventral processes arising at base of shaft, curving ventrad, then parallel to shaft, outer margins serrate but not branched, tips long and slender; pygofer short and heavy, apex broadly rounded.

Holotype male, allotype female and one female paratype, New Haven, Conn., August 20, 1934, R. H. Beamer; 2 male paratypes, Iuka, Miss., July 14, 1930, R. H. Beamer; and four female paratypes in U. S. N. M., from the following localities: 2, Vienna, Va., 1932; 1, Lehigh Gap, Pa., 1909; and 1, Relay St., Md. Types in

Snow Entomological Collection.

Osbornellus pallidus n. sp.

Resembling **O. clarus** n. sp. but usually distinctly pale in color, without the definite markings of the vertex, with the pygofer narrower at apex when compared to median width and processes of aedeagus as long as, or longer than, shaft. Length 5 to 5.5 mm.

Vertex about a right angle, length at middle about equal to width between eyes.

Color. General color tawny, lightly marked with fuscous. Vertex marked about as in most of other species, but rather indefinite except the anterior dark line which is usually heavy. Veins of elytra darker, the usual dark spots very light and indefinite.

Genitalia. Last ventral segment of female more than twice as long as preceding, lateral margins broadly rounding to middle of posterior margin. Male valve very broad and narrow, sides almost parallel; plates narrower than valve at base, length to attenuation not quite twice that of greatest width, attenuated portion not quite as long as basal, narrow; styles abruptly narrowed near middle, outer half quite slender, small hump on inner margin; aedeagus in lateral view very long and slender, curved dorsally with a pair of ventral processes arising at base and extending in a curve with shaft, clearing it, ending at or beyond apex of shaft; pygofer about one-fifth longer than greatest width, apex truncate, noticeably narrower in relation to its greatest width than in the case of **O. clarus.**

Holotype male, allotype female, four female and eight male paratypes, Patagonia, Ariz., June 24, 1933, R. H. Beamer; twenty-four paratypes, Patagonia, Ariz., 1933, P. W. Oman. Types and paratypes in Snow Entomological Collection, paratypes in U. S. N. M., and in collection of Doctor E. D. Ball.

Osbornellus lineatus n. sp.

Resembling **O. pallidus,** but darker, markings more in longitudinal lines and the aedeagus in lateral view three times as thick at base as at apex. Length 5-5.5 mm.

Vertex rather pointed in the male, somewhat blunter in the female, about as wide as long.

Color tawny with darker lineate markings. Vertex with marks of usual type, more definite than in **O. pallidus.** Veins of Elytra darker spots elongated so that general appearance is lined.

Genitalia. Last ventral segment of female at least twice as long as preceding, lateral angles broadly rounding to middle of posterior margin. Valve of male short, triangular; plates rather broad, length to attenuation not quite twice greatest width, attenuation rather heavy, longer than basal portion; styles abruptly narrowed near middle, apical portion with sides converging to outwardly rounded tips, small bump on inner margin near middle; aedeagus in lateral view at least three times as broad at base as at tip, curved dorsally ventral processes arising before base, very narrow, not more than one-third as wide as shaft at apex, extending to tip of shaft; pygofer much longer than wide, outer half with sides almost parallel, with corners rounded to flat tip.

Holotype male, allotype female, Patagonia, Arizona, June 24, 1933, R. H. Beamer; paratypes as follows: one male, Oak Creek Canyon, Ariz., August 14, 1927, R. H. Beamer; two males and three females, Patagonia, Ariz., E. D. Ball; one female, same place, R. H. Beamer; one female, Granite Dell, Ariz., E. D. Ball. Types and paratypes in Snow Entomological Collection, paratypes in collection of E. D. Ball.

Osbornellus consors (Uhler)

Scaphoideus consors Uhler, Md. Acad. Sci., i, p. 36, 1889.

Genitalia. Last ventral segment of female very long, lateral margins rounded to flattened median third which in turn has a small v-shaped notch. Valve of male short and broad, front and hind margins almost parallel, small tooth between plates; plates to attenuation about one third longer than greatest width, very few hairs on filaments; styles bent out and gradually narrowed on outer half; aedeagus in lateral view about five times as long as wide, with pair of many branched ventral processes arising near base, extending slightly beyond tip of shaft.

A female specimen in U. S. N. M., labeled as follows in Uhler's handwriting, **"Scaphoideus consors** Uhler Spice B. Halls sp." is here designated lectoholotype and the male, Vienna, Va., J. C. Bridwell, Sept. 1, 1932, agreeing with the female and described above, neoallotype. Other specimens are at hand from the following localities: College Park, Md., Mosquito trap, F. C. Bishop; Glen, N. H., Aug. 20, 1934, P. W. Oman; Notchland, N. H., August 20, 1934; Willow River, Minn., August 7, 1922, H. H. Knight; Iuka, Miss., July 14, 1930; Tiger-

ville, S. C., August 26, 1930; Prattsburg, Ga., July 25, 1930; New Haven, Conn., August 20, 1934; Polk County, Ark., August 21, 1928.

Osbornellus ater n. sp.

Resembling **O. clarus** n. sp. but without the definite markings of the vertex, with the aedeagus straight and broad in lateral view, and with the processes greatly broadened in middle. Length 4.75 mm.

Vertex rather acute, less than a right angle. Median length about the same as width between the eyes.

Color tawny with few darker markings. Vertex with usual pattern but the whole suffused so as to appear indefinite. Elytra with veins about the same color as remainder, a few lighter areoles and darker portions near apex.

Genitalia. Valve of male short, anterior margin broadly rounded with small median projection; plates rather broad, length to attenuation less than twice that of greatest width, attenuated portion short and narrow, considerably less than basal length; styles abruptly narrowed near middle, bent out and narrowed to slender apices; aedeagus in lateral view broad and straight, slightly enlarged on dorsal margin near apex, ventral processes arising basally, greatly enlarged on middle two-thirds, extending about one-third their length beyond aedeagus; pygofer about twice as long as wide, normal in shape with rounded apex.

Holotype male, Cameron Co., Tex., August 3, 1928, R. H. Beamer; one paratype male, Rock Springs, Tex., July 9, 1936, R. H. Beamer. In Snow Entomological Collection.

Osbornellus borealis DeL. & Mohr

Osbornellus borealis DeLong, D. M. & Mohr, C. O., Am. Mid. Nat., vol. 17, No. 6, p. 976, 1936.

Resembling **O. scalaris** (V. D.) but width of vertex about the same as length instead of distinctly longer, male pygofer apically more acute and aedeagus in lateral view slightly broader with processes only slightly longer than shaft of aedeagus, while **scalaris** usually has the processes about one third longer than shaft.

There are numerous specimens at hand from the Northwestern United States and many localities in British Columbia. If I have determined this species correctly, it is the common species in the Northwest, while **O. scalaris** is the common one in southern California.

PLATE I.

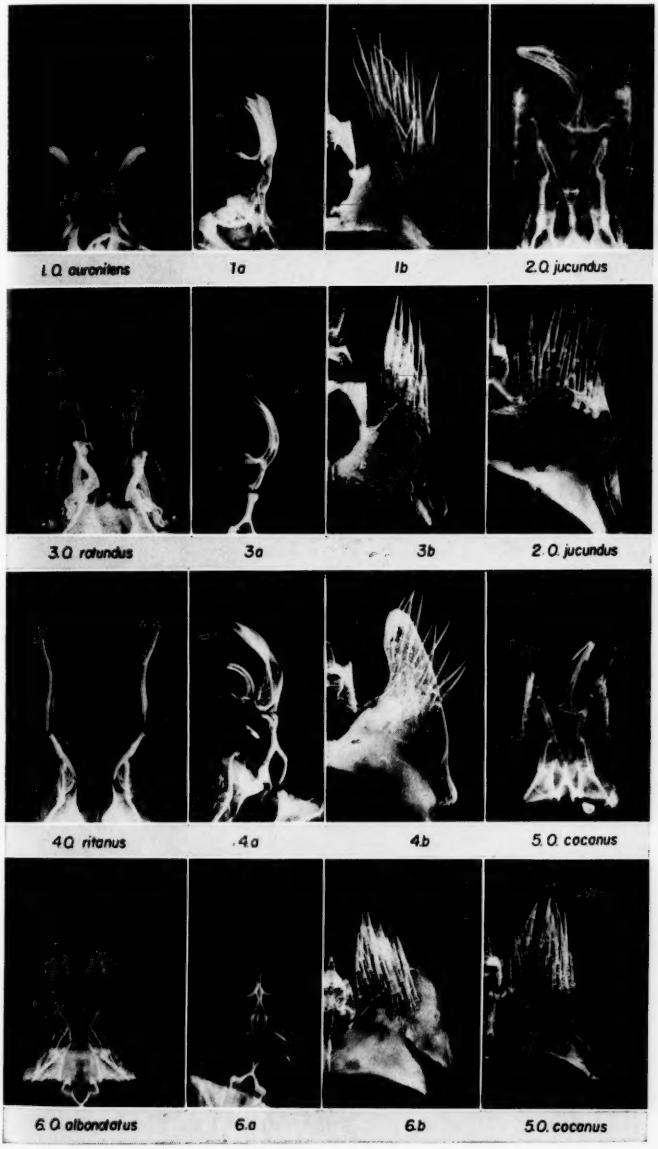

1.O. auroniteus
1a
1b
2.O. jucundus
3.O. rotundus
3a
3b
2. O. jucundus
4.O. ritanus
4a
4b
5. O. cocanus
6. O. albondatus
6a
6b
5.O. cocanus

PLATE II.

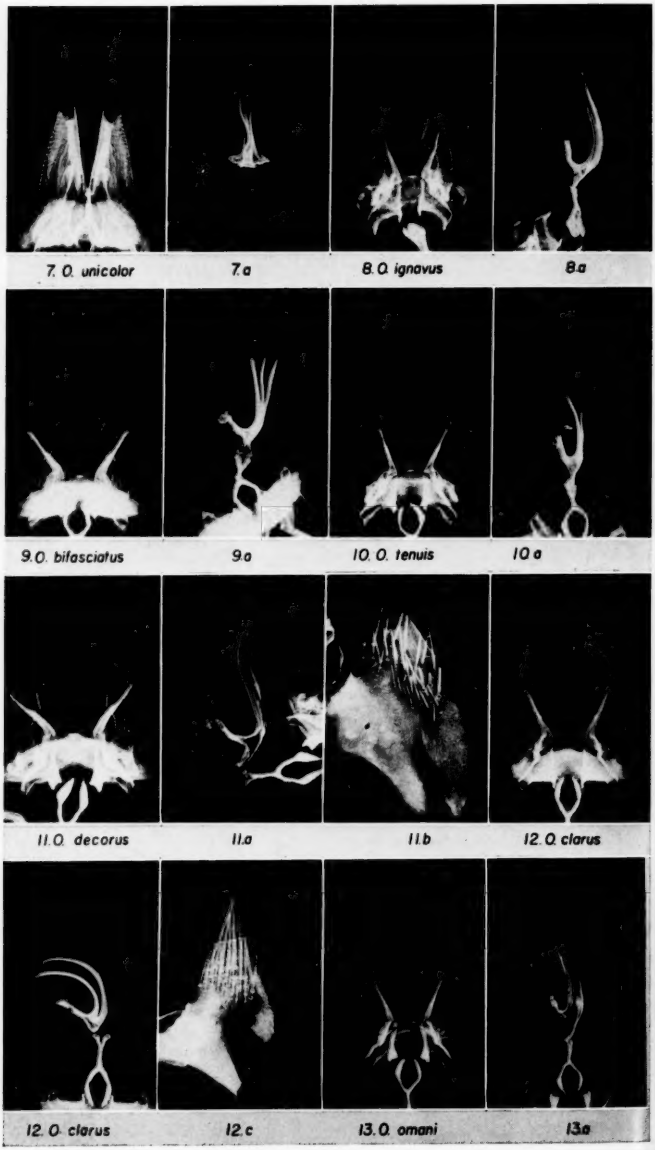

7. O. unicolor
7.a
8. O. ignavus
8.a
9. O. bifasciatus
9.a
10. O. tenuis
10.a
11. O. decorus
11.a
11.b
12. O. clarus
12. O. clarus
12.c
13. O. omani
13.a

PLATE III.

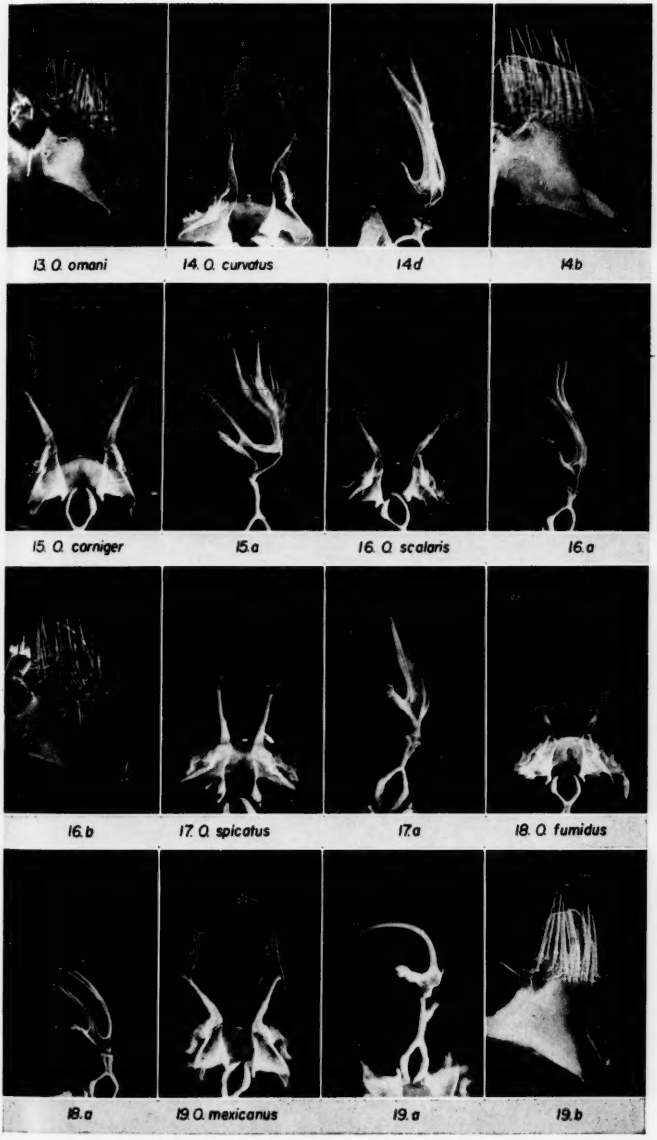
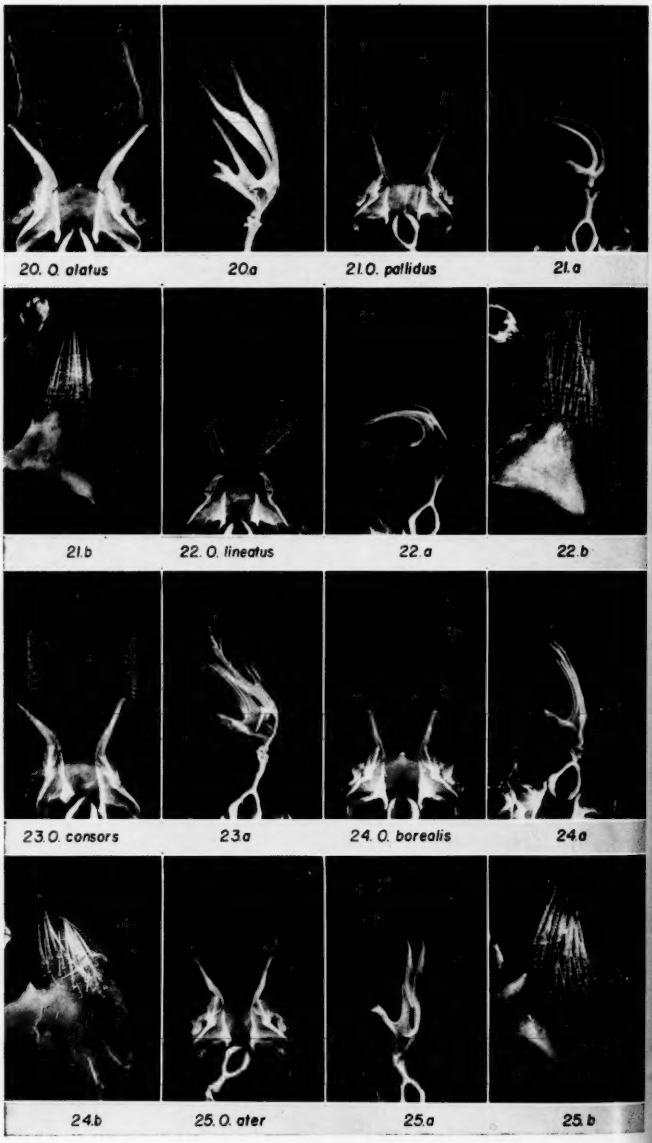

13. O. omani
14. O. curvatus
14d
14b
15. O. corniger
15a
16. O. scalaris
16a
16b
17. O. spicatus
17a
18. O. fumidus
18a
19. O. mexicanus
19a
19b

PLATE IV.


20. O. alatus
20a
21. O. pallidus
21.a
21.b
22. O. lineatus
22.a
22.b
23. O. consors
23a
24. O. borealis
24.a
24.b
25. O. ater
25.a
25.b

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